

Honeybee homing hampered by parasite

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Honeybees infected with a common parasite have a much lower chance of making it back from foraging trips, say scientists.

In an experiment at Rothamsted Research institute in Hertfordshire, 35 per cent of bees infected with *Nosema ceranae* never made it home. Among healthy foragers, the figure was less than ten per cent.

The findings are published in the journal *PLOS ONE*.

'This is obviously bad news for bees infected with the parasite,' says Dr Stephan Wolf, of Rothamsted Research, who led the study. 'But in some ways it's surprising that so many infected bees did so well.'

'We're talking about heavily infested animals, but we couldn't find any difference in their flight patterns - they didn't seem to get lost or

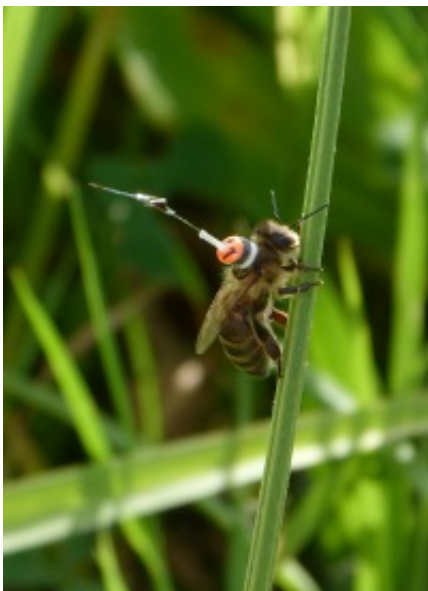
confused. It seems some of them were just too exhausted to make it back to the nest.'

'This raises important questions about why some infected bees are able to function in exactly the same way as healthy bees, while others are unable to cope.'

Managed honeybees pollinate important commercial crops throughout the world, but in recent years they have been in decline.

In a study published in January this year, scientists said many European countries are now facing honeybee shortfalls. The problem is particularly acute in Britain, where there are only enough honeybees to pollinate a quarter of crops.

Alongside the unintended consequences of pesticides targeted at other species, diseases and parasites have shouldered most of the blame.



Honeybee with radar transponder

Nosema parasite spores invade cells in the gut, drawing energy for themselves while damaging the bees' ability to absorb food.

There are two species of the parasite - *Nosema apis*, native to Europe, and *Nosema ceranae*, an Asian species which in recent years has spread rapidly throughout the world, and is now widespread throughout Europe and the UK.

Nosema ceranae can be terminal for honeybee colonies, but its symptoms are typically subtle in individual bees, giving away very few signs of infection before death.

Previous research suggested that it affects bees' ability to find their way back to the colony. To investigate what happened to them, the team attached tiny radar transponders to the backs of a mixture of clean and infected bees.

Each transponder, just 16mm long and weighing less than the average pollen load, sent a distinct signal back to the radar, allowing scientists to track the position of each bee in real time.

The bees were released onto a field at Rothamsted some distance from the colony, challenging them both to find their bearings and to make it all the way back to the hive.

Although there was very little difference between the flight characteristics of clean and infected bees, some infected [bees](#) seemed to become exhausted, taking longer stops before settling on the ground and disappearing from the radar.

The only available treatment for *Nosema* infections, a fungicide called fumagillin, is banned in the European Union over environmental safety concerns. And there is a debate among researchers about its

effectiveness against the parasites.

Scientists continue to work on developing safe and efficient alternatives.

More information: Stephan Wolf, Dino P. McMahon, Ka S. Lim, Christopher D. Pull, Suzanne J. Clark, Robert J. Paxton, Juliet L. Osborne, 'So Near and Yet So Far: Harmonic Radar Reveals Reduced Homing Ability of Nosema Infected Honeybees', 2014, *PLOS ONE*, [DOI: 10.1371/journal.pone.0103989](https://doi.org/10.1371/journal.pone.0103989)

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